Other Air Pollutants

In addition to the six criteria pollutants, DNR's Air Pollution Control Program also regulates other pollutants, including asbestos and hazardous air pollutants (HAPS).

ASBESTOS: Asbestos is a naturally occurring mineral that takes the form of hollow microscopic fibers. Before it was recognized as a carcinogen, asbestos was widely used for insulation and fireproofing. With age, it breaks down and becomes a hazard to anyone who breathes its fibers. Federal and state laws regulate the removal of asbestos from buildings and DNR monitors these activities.

HAZARDOUS AIR POLLUTANTS (HAPS): Some air pollutants can cause quick and painful death, cancer, reproductive disorders and environmental damage such as acid rain. The EPA has designated these pollutants as Hazardous Air Pollutants (HAPS), which may present a hazard to public health and safety when released in sufficient quantity.

Major Air Pollutants

The benchmarks for clean air in Missouri are the National Ambient (outdoor) Air Quality Standards (NAAQS) set by EPA under the Clean Air Act. The standards address six "criteria pollutants" considered harmful to public health and the environment: ozone, lead, inhalable particles, carbon monoxide, nitrogen dioxide and sulfur dioxide. These standards are found on page 7.

OZONE (URBAN SMOG): Ground-level ozone is a colorless gas, the most harmful part of what we commonly know as "smog." Ozone is not directly emitted. It forms on sunny hot summer days when sunlight causes a reaction between volatile organic compounds (VOCs) and nitrogen oxides (NOx). Vehicles, power plants and industrial boilers are common sources of nitrogen oxides. Gasoline powered vehicles are a major source of VOCs.

"Good up high - bad nearby"
There are two types of ozone: stratospheric (upper atmosphere) and ground-level ozone. Ozone in the stratosphere occurs naturally and is desirable, shielding the earth from ultraviolet rays. However, ozone at ground level is a powerful respiratory irritant.

AIRBORNE LEAD: In Missouri, airborne lead and its compounds are produced mainly by lead smelters. Children under six are the most endangered by airborne lead, so the standard has been set to protect their health. In 1985, 73 percent of airborne lead came from vehicle exhaust pipes. This dropped to 34 percent by 1988 due to federal controls on gasoline that started in the mid-1970s.

INHALABLE PARTICLES: Inhalable particles include airborne dust, pollen, soot and aerosol sprays. Scientists also sometimes refer to these as "particulate matter." Current federal standards apply to particles less than 10 microns in diameter, or PM10, emitted mainly by vehicles, industry and farms. Wind and rainfall cause seasonal variations in PM10. In 1997 EPA set new standards for even finer particles, less than 2.5 microns in diameter, or PM2.5. (see page 7)

CARBON MONOXIDE: Carbon monoxide (CO), formed by the incomplete combustion of fuel, is one of the most common pollutants. More than 75 percent of CO emissions come from vehicle exhaust and the highest concentrations are caused by congestion in metropolitan areas. Although it is deadly, CO is transformed rapidly into carbon dioxide.

NITROGEN DIOXIDE: Almost all nitrogen dioxide is man-made. If fuel is burned above 1200 degrees Fahrenheit, airborne nitrogen forms highly reactive nitrogen oxides such as nitrogen dioxide. Principal sources are power plants, industrial boilers and vehicles.

SULFUR DIOXIDE: Sulfur oxides are produced by burning sulfur-containing fuels such as coal and oil, by smelting metals and by other industrial processes. Sulfur dioxide (SO2) composes about 95 percent of these gases.

Health Effects of Air Pollution

Pollutant	*Health Effects*
OZONE A colorless gas, ozone is the most harmful part of what we commonly call "smog."	Throat irritation, congestion, chest pains, nausea and labored breathing. Aggravation of existing lung or heart conditions, allergies and asthma. Ozone is especially harmful to those who work or play outside. Ozone is also harmful to plant life, damaging forests and reducing crop yields.
LEAD Dust-like particles ranging from light gray to black.	Low doses damage the central nervous system of fetuses and children, causing seizures, mental retardation and behavioral disorders. In children and adults lead causes fatigue, disturbed sleep, decreased fitness, and damage to kidneys, liver and blood-forming organs. High levels damage the nervous system and cause seizures, coma and death.
INHALABLE PARTICLES A broad class of particles 10 micrometers or smaller in diameter, that may include airborne soot, dust, pollen and aerosol sprays.	Increased likelihood of chronic or acute respiratory illness. Difficulty breathing, aggravation of existing respiratory or cardiovascular illness and lung damage.
CARBON MONOXIDE An odorless, colorless, tasteless, poisonous gas.	Impaired vision and manual dexterity, weakness and mental dullness. At high levels: vomiting, fast pulse and breathing, followed by slow pulse and breathing, then collapse and unconsciousness.
NITROGEN DIOXIDE A poisonous, reddish-brown to dark brown gas with a strong odor.	Lung inflammation and lower resistance to infections like bronchitis and pneumonia. Suspected of causing acute respiratory diseases in children.
SULPHUR DIOXIDE A colorless gas with a strong suffocating odor.	Irritation of throat and lungs with difficulty in breathing. Aggravation of existing respiratory or cardiovascular illness.
HAZARDOUS AIR POLLUTANTS Numerous chemicals classified by their hazardous health effects.	May cause cancer, reproductive disorders and death.
ASBESTOS Densely packed microscopic fibers, once used for insulation and fireproofing.	Lung cancer, asbestosis (a progressive irreversible scarring of the lungs) and mesothelioma (cancer of the chest cavity's lining).

Clean Air Standards

Federal Ozone Standard Timeline

Year 1997 Data gathering begins for EPA eight-hour standard.

Year 2000 EPA assigns area designations for attainment of eight-hour standard.One-hour standard still in effect.

Year 2003 Missouri to submit new State Implementation Plan (SIP) showing attainment of eight-hour standard.

The Clean Air Act established two types of national air quality standards. Primary standards set limits to protect public health, including the health of "sensitive" populations such as asthmatics, children and the elderly. Secondary standards set limits to protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation and buildings.

New Standards

EPA established new health-based standards for ground-level ozone and particulate matter in July 1997. The standards were established after extensive scientific reviews showed that the changes were necessary to protect public health and the environment. These new standards will bring major changes in Missouri's approach to achieve healthy air quality in the future.

Ozone

The new ozone standard will reduce allowable concentrations from 0.12 parts per million averaged over a one-hour period to a standard of 0.08 parts per million averaged over an eight-hour period. Federal designations of areas that are in attainment of the new standards will be based on an average of three years of the fourth highest annual daily maximum eight-hour concentration.

Fine Particulate Matter

In revising the air quality standards, EPA created new standards for PM2.5 (fine particulate matter less than 2.5 microns in diameter). EPA' s scientific review concluded that fine particles, which penetrate deeply into the lungs, are more damaging to human health than the coarse particles known as PM10. EPA also modified the 24-hour PM10 (fine particulate matter less than 10 microns in diameter) standard to be based on a three-year average of the 99th percentile of data. These standards are listed in the table on page 7.

The time schedule for this PM2.5 standard to be implemented and attained will take several years because a new monitoring system for this type of pollution must be created. Based on EPA guidance, Missouri has designed a monitoring network of 30 monitors. The system is required to be in operation by the end of 1999. By the end of 1998, 19 monitors were established and in operation. EPA will designate area attainment by 2003 based on three years of gathered data beginning in 2000.

Air Quality Monitors in Missouri

In 1998, the Missouri Air Pollution Monitoring Network included 119 monitors of three types: national monitors, state and local agency monitors, and special-purpose monitors. National monitors provide data on national trends. State and local agencies operate other permanent monitors. Special-purpose monitors are placed for a limited time to study small areas or special sites. The monitors are placed to gather representative data as well as worst-case occurrences. There are also 44 meteorological monitors in operation throughout the state. The data collected at these monitors are used for analysis and modeling purposes.

National Ambient Air Quality Standards

Criteria Air Pollutant	*Averaging Time*	*Primary Standard*	*Secondary Standard*
Carbon Monoxide	One-hour maximum[a] Eight-hour maximum[a]	40 mg/m^3[b] (35 ppm[c]) 10 mg/m^3 (9 ppm)	
Lead	Three-month Arithmetic Mean	1.5 :g/m3 d	Same As Primary Standard
Nitrogen Dioxide	Annual Arithmetic Mean	100 :g/m^3 (0.05 ppm)	Same As Primary Standard
Ozone	One-hour average[a] Eight-hour average[e]	0.12 ppm (235 :g/m^3) 0.08 ppm (157 :g/m^3)	Same As Primary Standard Same As Primary Standard
Particulate Matter (PM_{10})	Annual Arithmetic Mean 24-hour average[f]	50 :g/m^3 150 :g/m^3	Same As Primary Standard
Particulate Matter ($PM_{2.5}$)	Annual Arithmetic Mean[g] 24-hour average[h]	15:g/m^3 65:g/m^3	Same As Primary Standard
Sulfur Dioxide	24-hour maximum[a] Annual Arithmetic Mean Three-hour maximum[a]	365 :g/m^3 (0.14 ppm) 80 :g/m^3 (0.03 ppm)	 1300 :g/m^3 (0.5 ppm)

a Not to be exceeded more than once a year for primary and secondary standards.
b mg/m^3 = milligrams per cubic meter.
c ppm = part per million.
d :g/m^3 = micrograms per cubic meter.
e Established for a three-year average of the fourth highest daily maximum concentration.
f Established for a three-year average of the 99th percentile of data.
g Established for a three-year average.
h Established for a three-year average of the 98th percentile of data.